

November 10, 1954

Full-Wave Vacuum Rectifier Type 5U4-G

The 5U4-G is a glass octal full-wave high-vacuum rectifier designed for service in power supplies of high current requirements. The tube should be mounted vertically, but horizontal mounting is permissible if pins 1 and 4 are in a vertical plane. Like all power handling tubes, the 5U4-G should be adequately ventilated. Electrically, the 5U4-G is similar to the types 5X4-GT and 5Z3.

GENERAL DATA

Electrical:

Cathode Coated Filament
Voltage 5.0 ac or dc Volts
Current 3.0 Amperes

Mechanical:

Bulb ST-16
Base B5-15, Medium Shell Octal 5-Pin
Basing G-5T
Mounting Position Vertical
Horizontal with Pins 1 and 4
in Vertical Plane

RECTIFIER SERVICE*

Maximum Ratings

Design Center Values

Peak Inverse Plate Voltage 1550 max. Volts
Maximum AC Plate Supply Voltage
Each Plate (RMS) See Chart I
Maximum DC Output Current
Each Plate See Chart I
Steady-State Peak Plate Current
Each Plate (See Chart II) 800 max. Ma.
Transient Peak Plate Current
Each Plate (See Chart III) 4.0 max. Ampere

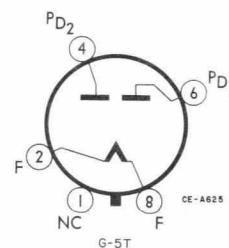
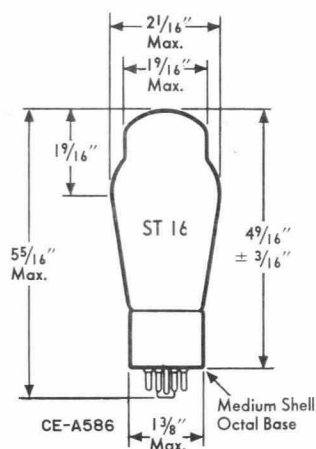
Typical Operation as Full-Wave Rectifier

	Input to Filter			
	Capacitor			Choke
AC Plate Supply Voltage				
Each Plate (RMS)	450	300	550	Volts
Input Capacitor	40	40	..	μf.
Input Choke	..	..	10	Henrys
Effective Plate Supply				
Resistance Each Plate. 85	35	..	Ohms	
DC Output Current	225	245	225	Ma.
DC Output Voltage				
at Filter Input	470	290	440	Volts

AVERAGE CHARACTERISTICS

Tube Voltage Drop (Measured with
Tube Conducting 225 Ma. Each Plate) ... 44 Volts

* For use with sinusoidal supply voltages within the frequency range of 25 to 1000 cps.



APPLICATION NOTES

The application of maximum ratings to practical circuit design is clarified by the use of Rating Charts I, II, III. These charts present limiting conditions beyond which operation of the 5U4-G is not permitted. The charts together with laboratory measurements provide analysis of rectifier circuit operation.

The maximum ratings for ac plate supply voltage and dc output current are interdependent, and they are related to the type of filter circuit. The boundaries in Chart I for capacitor-input and for choke-input operation are based on limits of supply voltage, output current and plate dissipation. With capacitor-input filter, operation is permissible within the area bounded by points F A E D G; with choke-input filter, operation is permissible within the area bounded by points F A B C D G.

Chart II defines the permissible area of operation based on the maximum steady-state peak plate current. The rectification efficiency is defined by the equation

$$\text{Rectification Efficiency} = \frac{\bar{E}}{\sqrt{2} E_s}$$

where $\bar{E}$ is the dc output voltage at input to filter and E_s is the rms plate supply voltage per plate.

Chart III defines the minimum value of effective plate-supply resistance per plate for specific plate supply voltages such that the transient peak plate current per plate will be within the required maximum rating. This resistance consists of

$$R_a = N^2 R_{pri.} + R_{sec.} + R_a$$

where N is the voltage step-up ratio of the plate transformer, $R_{pri.}$ is the dc resistance of the transformer primary, $R_{sec.}$ is the average dc resistance of each transformer secondary section, and R_a is the additional resistance required.

In these considerations, dc output voltage is measured at the input to the filter, and plate supply voltage is measured under no-load conditions.

RATING CHART I

